

*Abstract for policy makers, April 2026*

## **Measures to Reduce Black Carbon Emissions from Arctic Shipping**

The project *Reducing the impact of black carbon emissions from shipping on the Arctic* is managed by the Clean Arctic Alliance and funded by the Clean Air Fund through 2025-27. This abstract contains key findings from three feasibility studies carried out in Greenland, Canada and Iceland to identify national actions that could deliver short-term black carbon (BC) emissions reductions from shipping. International regulation from the International Maritime Organization mandating the use of distillate fuels (polar fuels) in the Arctic is needed to regulate black carbon emissions from all Arctic shipping.

### **Conclusions**

Feasible short-term national measures to reduce Arctic BC emissions from shipping include:

- 1) Implement green corridors requiring ships to use distillate fuels.
- 2) Ban discharges of scrubber wastewater so that ships use distillate fuels.
- 3) Incentivise (e.g. by financial supporting) fully electric fishing vessels and onshore power for fishing vessels in ports with partly or full green electricity supply.

### **Background**

Black carbon (BC) is a short-lived pollutant that contributes significantly to health damage and global heating. This heating is particularly strong in the Arctic region, where BC deposits on snow and ice and reduces reflection of sunlight, warming the ice and accelerating melting, causing exposure of dark areas of sea and land beneath the snow and ice. Loss of reflectivity creates a warming feedback loop: more heat being absorbed thereby amplifying further snow and ice loss and more heating. This is one of the reasons the Arctic is warming nearly four times faster than the rest of the world<sup>1</sup>.

Shipping is an important sector to consider when dealing with emissions of BC in the Arctic. As temperatures warm and sea ice recedes, Arctic waters are becoming increasingly navigable to shipping. BC emissions from Arctic shipping increased across all geographical scopes from 2019 to 2024: rising from 259 to 759 metric tonnes in the Polar Code area and from 2,696 to 3,310 metric tonnes above 60°N latitude<sup>2</sup>.

Interest from the shipping industry and key countries in harnessing shorter shipping routes from Asia to Europe through the Arctic is compounded by geopolitical stressors further south - an increase in Arctic shipping would lead to more BC emissions in the Arctic. Ships using heavy residual fuel oil blends, such as heavy fuel oil, emit significantly more BC in the Arctic than ships using distillate fuels such as marine gas oil. However, fishing vessels contribute the largest share of BC, reflecting their high numbers, even if most already operate on distillate fuels.

The International Maritime Organization has been considering strategies to reduce BC emissions for over 15 years, yet no mandatory measures have yet been adopted. BC reductions from the upcoming Arctic HFO ban and Northeast Atlantic emission control area (ECA) are limited (less than 10% Arctic BC reductions) since only a limited part of shipping is affected by this regulation<sup>2</sup>.

The Clean Arctic Alliance is leading a project which aims to increase awareness of the impact of BC emissions from shipping on the Arctic cryosphere and secure consensus to regulate black emissions.

## National measures

Five short-term national measures to reduce BC emissions from arctic shipping were investigated:

- 1) *Green corridors* between ports reduce BC by 80% when cargo ships switch to distillate fuels.
- 2) *Scrubber water discharge bans* reduce BC by 80% when cargo ships switch to distillate fuels.
- 3) Retrofitting fishing vessels with *particulate filters* remove 90% of BC from their exhaust.
- 4) Retrofitting fishing vessels with *batteries* charged by green electricity eliminates BC.
- 5) *Onshore green power* for fishing vessels eliminates BC from fishing vessels in ports.

Since BC is a short-lived pollutant with an average lifetime in the atmosphere around two weeks, these actions would result in fast BC reductions leading to immediate reductions of Arctic warming.

## Methods and results

The project team has identified several actions to reduce BC emissions in the three countries that show promise in reducing BC in the three regions:

### Greenland

Green corridors between Nuuk and Reykjavik and a Greenlandic scrubber water discharge ban would efficiently reduce BC emissions and can be implemented for low costs. Retrofitting fishing vessels with batteries does not seem feasible in the short term, whereas particulate filters might be a feasible way to reduce BC emissions for vessels with four-stroke engines. Onshore power for fishing vessels in ports with green electricity supply should be investigated further and implemented where possible.

### Canada

Green corridors on the busiest Canadian Arctic routes is a realistic way of effectively reducing BC emissions and can be implemented at a reasonable cost. A scrubber discharge ban is also a practical measure to prevent future increases in BC emissions from increased scrubber use as a compliance pathway. Retrofitting fishing vessels with batteries or onshore power is unlikely to be feasible yet due to limited sustainable electricity supply, though the potential warrants continued investigation.

### Iceland

Green corridors between Nuuk and Reykjavik and an Icelandic scrubber water discharge ban would efficiently reduce BC emissions and can be implemented for low costs. Retrofitting smaller day fishing vessels with batteries seems feasible in the short term and more efficient than filters to reduce BC emissions. Onshore power for trawlers in Reykjavik port should be investigated further.

## Perspectives

The reduction and prevention of black carbon emissions from the five actions listed above will not solve the challenges of BC emissions from Arctic shipping, since ships sailing outside the green corridors and beyond territorial scrubber water discharge bans (out to 12 nm) are unaffected - and because only a few fishing vessels are included in the studies. However, these actions demonstrate feasible actions to inspire other key stakeholders to implement similar actions thereby significantly scaling up Arctic BC reductions, and act as a preventative measure to combat against the potential of future increased BC emissions from the increased use of Arctic shipping routes.

More info about BC emissions in the Arctic: [www.cleanarctic.org](http://www.cleanarctic.org)

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<sup>1</sup> <https://www.nature.com/articles/s43247-022-00498-3>

<sup>2</sup> <https://cleanarctic.org/2025/12/15/five-years-of-black-carbon-emissions-from-ships-in-the-arctic-2019-2024/>